

- dance of diurnal raptors in the panhandle of Nebraska. *Wilson Bull.* 80:479–486.
- MILLSAP, B.A. AND M.N. LEFRANC, JR. 1988. Road transect counts for raptors: how reliable are they? *J. Raptor Res.* 22:8–16.
- PARKER, R.E. AND E.G. CAMPBELL. 1984. Habitat use by wintering birds of prey in southeastern Arizona. *West. Birds* 15:175–183.
- PROVINCE OF BRITISH COLUMBIA. 2001. Inventory Methods for Raptors. Standards for Components of British Columbia's Biodiversity No. 11. Ministry of Sustainable Resource Management Environment Inventory Branch for the Terrestrial Ecosystems Task Force Resources Inventory Committee. Victoria, BC Canada.
- SHERRY, T.W. AND R.T. HOLMES. 1995. Summer versus winter limitation of populations: what are the issues, what is the evidence. Pages 85–120 in T.E. Martin and D.M. Finch [EDS.], *Ecology and management of neotropical migratory birds: a synthesis and review of the critical issues*. Oxford Univ. Press, Oxford, U.K.
- SMALLWOOD, S.K., B.J. NAKAMOTO, AND S. GENG. 1996. Association analysis of raptors on a farming landscape. Pages 177–190 in D. Bird, D. Varland, and J. Negro [EDS.], *Raptors in human landscapes*. Raptor Research Foundation, Academic Press, Ltd., San Diego, CA U.S.A.
- SOKAL, R.R. AND F.J. ROHLF. 1995. *Biometry: the principles and practice of statistics in biological research*. W.H. Freeman and Company, New York, NY U.S.A.
- STAHLDECKER, D.W. AND T.E. BELKE. 1974. Winter diurnal raptor populations of three habitat types in north-eastern Colorado. *Colo. Field Ornithol.* 20:6–17.
- U.S. CENSUS BUREAU. 2001. United States Census 2000. U.S. Department of Commerce Economics and Statistics Administration, <http://www.census.gov>.
- WASHINGTON OFFICE OF FINANCIAL MANAGEMENT. 1998. Population trends. Washington Office of Financial Management, Olympia, WA U.S.A.

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NESTING OF THE WHITE-THROATED HAWK (*BUTEO ALBIGULA*) IN DECIDUOUS FORESTS OF CENTRAL CHILE

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The White-throated Hawk (*Buteo albigula*; Philippi 1899) is found throughout the Andes mountain range, from northwestern Venezuela through southern Chile and southwestern Argentina (Brown and Amadon 1968). In Chile, the species has been considered an all-year res-

ident between the latitudes of 27° and 40°S (Goodall et al. 1957), a local migrant (Zalles and Bildstein 2000), or its residency status was unknown (Jaksic and Jiménez 1986). Pavez (2000) presented the first evidence of migratory movements. He reported its presence in Chile only during the breeding season (i.e., between September and April), inhabiting high-elevation *Nothofagus* forests (Olrog 1979, Navas and Manghi 1991, Casas and Gelain 1995, Pavez 2000).

Information on the species' breeding biology is scant

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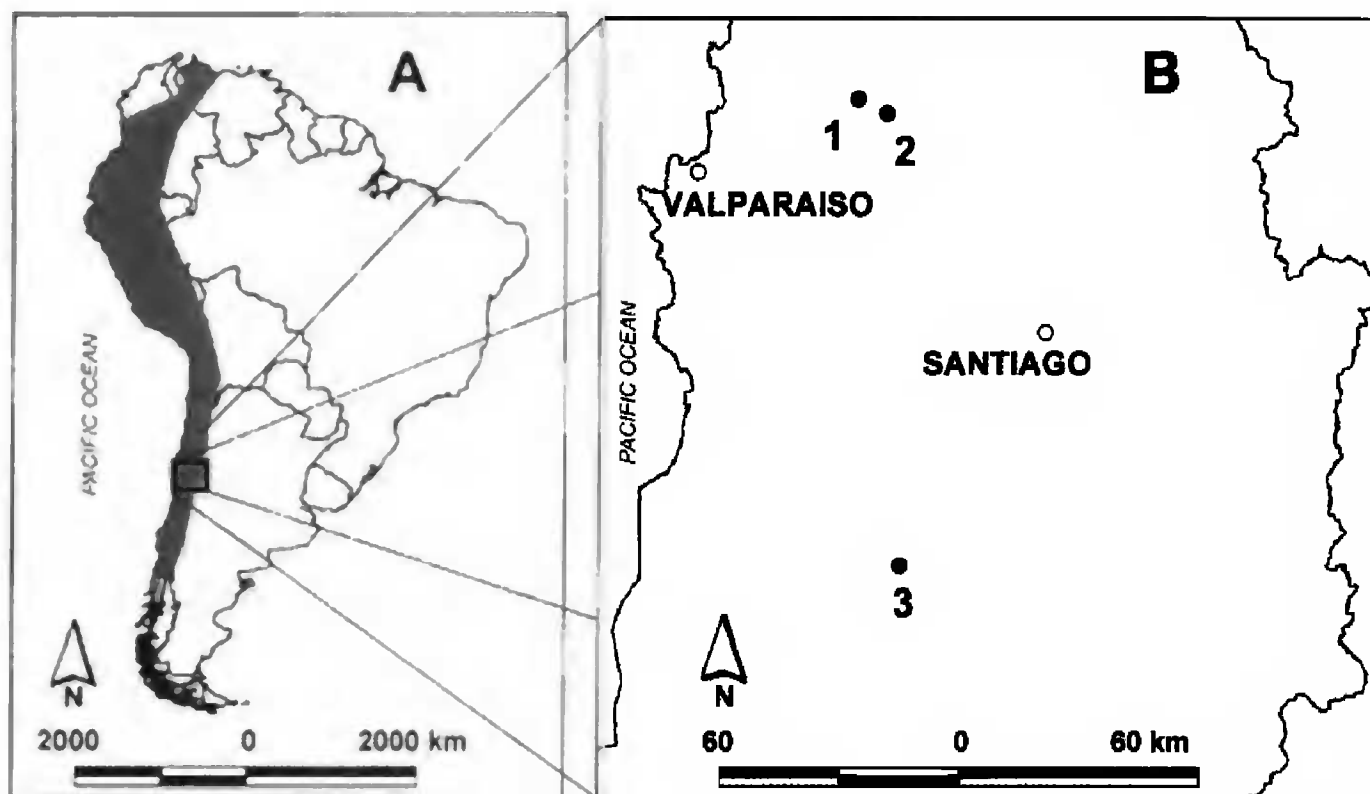


Figure 1. Distribution map of White-throated Hawks (*Buteo albigula*) in South America (A) and the locations in central Chile where observations of this species were noted in this study (B): La Campana National Park (1), Cerro El Roble (2), and Altos de Cantillana (3).

(del Hoyo et al. 1994). According to de la Peña (1992), the White-throated Hawk nests in trees, laying two to three eggs. Recent data have been provided on two nesting pairs in a lenga forest (*Nothofagus pumilio*) by Trejo et al. (2001) and on a larger sample of breeding White-throated Hawks in northwest Argentinean Patagonia, 900 km south of central Chile, by Trejo et al. (2004). In Chile, only one documented breeding record exists, corresponding to a nest on a coastal cliff near Tongoy, in north central Chile (30°25'S, 71°50'W; Goodall et al. 1957). This is the northernmost nesting site recorded for the species. In order to contribute to our knowledge of this rare and poorly-known neotropical raptor, we present information on its nesting and breeding behavior in central Chile.

A pair of White-throated Hawks, which we presumed to be the same individuals, was observed over three consecutive breeding seasons. In spring (4 October 1998), we found an occupied White-throated Hawk nest at La Campana National Park (32°58'S, 71°07'W, 300–1900 m above sea level) on the coastal chain of mountains in central Chile (Fig. 1). The nest site was located at an altitude of 1200 m, on a south facing slope in a native forest dominated by southern beech (roble) trees (*Nothofagus macrocarpa*). The nest, which was nearly 1-m in diameter, was found on the top of a 25 m tall evergreen peumo tree (*Cryptocarya alba*) and located 50 m away from a secondary park road. As reported by Gelain et al. (2001), tourism and cars did not seem to affect the nesting behavior of this pair.

The nesting pair reared one chick that left the nest in summer (January 1999). The nest was reused the follow-

ing spring (October 1999) and the birds reared another chick, which again fledged in summer (January 2000). Also, on 6 October 2000 we observed a pair flying around the same nest, and a juvenile White-throated Hawk was recorded flying over the breeding territory near that nest on 11 March 2001. Plumage color of that juvenile was similar to the 2.5-mo-old dead bird described by Ojeda et al. (2003).

Deliveries of materials to the nest and courtship flights with constant vocalizations were observed during the pre-laying period (15 hr of observations). Two copulations were recorded in spring (2 October 1999 and 6 October 2000). Six prey deliveries to the nest by the male were witnessed during the brood-rearing period (21 hr of observation). Two reptiles (a Chilean racerunner [*Callopistes palluma*] and a lemniscated lizard [*Liolaemus lemniscatus*]), three birds (an Austral Thrush [*Turdus falcklandii*], and what appeared to be one Fire-eyed Diucon [*Xolmis pyrope*], and one White-crested Elaenia [*Elaenia albiceps*]), and an unidentified rodent were consumed by chicks. Although the forest floor under the nest was searched thoroughly, no prey remains nor pellets were found. A young hawk was recorded flying around the nest close to the adult female at the end of the summer (3 hr of observation on 11 March 2000).

Adult White-throated Hawks were detected three times in the area during the breeding season. One of them, an adult male, flew ca. 300 m from the known nest, but the male of the pair did not show any aggressive display toward the "intruder." This suggested that other pairs likely nested in the area.

No hawks were recorded in the study area during the

nonbreeding season (28 hr of observations between April and August 1999). This coincides with the findings of Pavez (2000) regarding the timing of the migratory movements (i.e., departure from the breeding territory in April).

Other records also help establish the dates of the breeding season in the coastal mountains of central Chile. An adult hawk was recorded in early spring (29 September 1997) perched in a well-developed forest on El Roble hill (32°59'S, 70°59'W), located 10-km southeast of La Campana hill. This observation corresponds to the earliest White-throated Hawk record for the breeding season in the area. A pair of White-throated Hawks that had established their territory in a roble-forest stand (*Nothofagus macrocarpa*) at an altitude of 1600–1850 m in the mountains of Loncha, in the area of Altos de Cantilana (34°06'S, 70°59'W) was recorded during October 2000. This site is part of the same coastal mountain range as La Campana, but is located ca. 125-km further south (Fig. 1).

Our observations agree with Pavez (2000) and Trejo et al. (2001) in relation to the characteristics of the breeding habitat (i.e., *Nothofagus* forests in mountainous areas). This, in addition to other records made in the El Roble hill area by J. Jiménez (pers. comm.), who observed a female displaying breeding behavior in *Nothofagus macrocarpa* forest, suggests that in central Chile the few native mountainous forest areas located in the coastal mountain range in La Campana and El Roble hills could be a primary breeding area for this hawk. These habitats are located on the top of the coastal mountain range, between 33° and 34°S latitude, in a narrow and discontinuous north-south corridor ca. 125 km in length. Nevertheless, additional sampling in exotic forests would be necessary in order to know whether this hawk may also breed in disturbed habitat. Considering the known habitat and that cliff nesting by this species has not been confirmed, we believe that it is unlikely for White-throated Hawks to nest on coastal cliffs, such as was reported by Goodall et al. (1957), at a site near Tongoy (30°20'S).

Given the high rate of destruction of deciduous native forests of central Chile (Lara et al. 1995), the breeding habitat of the White-throated Hawk in its northern breeding range is threatened (Jaksic et al. 2001). Furthermore, this species is considered rare and deserves more conservation attention (Jaksic and Jiménez 1986). Special attention should be given to those protected areas that have *Nothofagus* forest, which may be essential for successful breeding by this hawk. Also, the creation of new protected areas with suitable habitat in central Chile could have a positive impact.

Our data revealed this hawk's breeding phenology in central Chile. In September, the birds arrive, probably from the northern Andes (Pavez 2000), on their breeding territories and repair the nests. Copulation and laying occur in October and chick-rearing occurs from November–January. After fledging, the juveniles remain with the

parents in the breeding territory, and then disperse at the end of March and the beginning of April. Our data agree with Trejo et al. (2004) about the duration of each breeding stage in Chile, but the breeding period is slightly earlier than in Argentinean Patagonia. This sequence matches the breeding behavior described for other migratory accipiters, including a short stay by the juvenile on the parents' territory followed by the departure of adults and juveniles from the breeding territory on about the same date (Newton 1979).

RESUMEN.—Aquí presentamos los resultados de observaciones sobre una pareja de aguilucho chico (*Buteo albigula*) durante tres períodos reproductivos sucesivos en Chile central. La pareja utilizó el mismo nido durante todo el estudio. El nido se ubicó en un bosque dominado por robles (*Nothofagus macrocarpa*), en la ladera de un cerro a 1200 m de altitud, criando un pollo por estación reproductiva. La conducta reproductiva siguió un patrón esperable para buteos. Se observó actividad de otros aguiluchos en el área. No se observó presencia de aguiluchos fuera del período reproductivo, lo que se explicaría por su carácter migratorio. Nuestras observaciones indican que los bosques de *Nothofagus*, son el hábitat usado para la reproducción de esta especie en Chile central
[Traducción de los autores]

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LITERATURE CITED

- BROWN, L. AND D. AMADON. 1968. Eagles, hawks and falcons of the World. Vol. I. McGraw Hill, New York, NY U.S.A.
- CASAS, A. AND M. GELAIN. 1995. Nuevos datos acerca del estatus del aguilucho andino *Buteo albigula* en la Patagonia Argentina. *Hornero* 14:40–42.
- DE LA PEÑA, M. 1992. Guía de las aves Argentinas. Tomo II. Literature of Latin America, Buenos Aires, Argentina.
- DEL HOYO, J., A. ELLIOTT, AND J. SARGATAL (EDS.). 1994. Handbook of the birds of the world. Vol. 2. Lynx Edicions, Barcelona, Spain.
- GELAIN, M., V. OJEDA, A. TREJO, L. SYMPSON, G. AMICO, AND R. VIDAL-RUSSELL. 2001. Nuevos registros de distribución y nidificación del aguilucho andino (*Buteo albigula*) en la Patagonia Argentina. *Hornero* 16:85–88.
- GOODALL, J.D., A.W. JOHNSON, AND R.A. PHILIPPI. 1957. Las aves de Chile, su conocimiento y sus costumbres,

- Tomo II. Platt Establecimientos Gráficos, Buenos Aires, Argentina.
- JAKSIC, F.M. AND J.E. JIMÉNEZ. 1986. The conservation status of raptors in Chile. *Birds of Prey Bull.* 3:95–104.
- , E.F. PAVEZ, J.E. JIMÉNEZ, AND J.C. TORRES-MURA. 2001. The conservation status of raptors in the Metropolitan Region, Chile. *J. Raptor Res.* 35:151–158.
- LARA, A., C. DONOSO, AND J.C. ARAVENA. 1995. La conservación del bosque nativo en Chile: problemas y desafíos. Pages 335–362 in J. Armesto, C. Villagrán, and M.K. Arroyo [EDS.], *Ecología de los bosques nativos de Chile*, Ed. Universitaria, Santiago, Chile.
- NAVAS, J. AND M. MANGHI. 1991. Notas sobre *Buteo ventralis* y *Buteo albigula* en la Patagonia Argentina (Aves, Accipitridae). *Rev. Mus. Argent. Cienc. Nat. Zool.* 15:87–94.
- NEWTON, I. 1979. Population ecology of raptors. T. & A.D. Poyser, London, U.K.
- OJEDA, V., M. GELAIN, L. SYMPSON, AND A. TREJO. 2003. Desarrollo morfológico y conductual de pollos de aguilucho chico *Buteo albigula* (Aves: Accipitridae) en le noroeste de la Patagonia Argentina. *Rev. Chil. Hist. Nat.* 76:451–457.
- OLROG, C. 1979. Nueva lista de la avifauna Argentina. Fund. Miguel Lillo, Tucumán, Argentina.
- PAVEZ, E. 2000. Migratory movements of the White-throated Hawk (*Buteo albigula*) in Chile. *J. Raptor Res.* 34:143–147.
- PHILIPPI, R. A. 1899. *Anales de la Universidad de Chile* 103:664.
- TREJO, A., V. OJEDA, AND L. SYMPSON. 2001. First nest records of the White-throated Hawk (*Buteo albigula*) in Argentina. *J. Raptor Res.* 35:169–170.
- , V. OJEDA, L. SYMPSON, G., AND M. GELAIN. 2004. Breeding biology and nest characteristics of the White-throated Hawk (*Buteo albigula*) in northwestern Argentine Patagonia. *J. Raptor Res.* 38:314–321.
- ZALLES, J.I. AND K.L. BILDSTEIN (EDS.). 2000. Raptor watch: a global directory of raptor migration sites. BirdLife International, Cambridge, U.K. and Hawk Mountain Sanctuary, Kempton, PA U.S.A.

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